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Appl. No. 10/762,164
Reply to Office Action of March 29, 2006

Attorney Docket No. 2002-0246 / 24061.477
Customer No. 42717

REMARKS

Claims 20-22 and 24-41 are pending in the application. In view of the remarks that follow, Applicants respectfully request reconsideration.

Power of Attorney

A new Power of Attorney was filed in the PTO more than a year ago, on January 13, 2005. The Power of Attorney also updated the correspondence address. The last Office Action (dated August 11, 2005) was mailed to an obsolete correspondence address. Applicants' last Response asked the Examiner to ensure that the correspondence address has been updated in the PTO computer system. However, more than a year after filing of the change of correspondence address, the current Office Action (dated March 29, 2006) was mailed to the obsolete correspondence address. Applicants therefore again respectfully request that the Examiner ensure the new correspondence address and the new Power of Attorney have been properly entered into the PTO computer system, so that future PTO correspondence will be mailed to the correct address.

Allowed Claims

Noted with appreciation is the indication in the Office Action that Claims 28-41 are still allowed.

Comment Regarding Response to Arguments

MPEP §707.07(f) provides that:

In order to provide a complete application file history and to enhance the clarity of the prosecution history record, an examiner must provide clear explanations of all actions taken by the examiner during prosecution of an application. . . . Where the

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applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it.

The present Office Action sets forth, word-for-word, exactly the same §103 rejections that were presented in the prior Office Action. Applicants' last Response traversed these rejections. But the present Office Action fails to comply with MPEP §707.07(f), because the Office Action fails to "take note of the applicant's argument and answer the substance of it".

In more detail, the subtitle "Response to Arguments" appears at the top of page 2 of the Office Action, and this subtitle is followed by paragraphs 2-4. However, paragraphs 2-4 do not answer any of the arguments that were presented in the traverse of the §103 rejections in Applicants' last Response.

First, paragraph 2 begins by stating it is responding to Applicants' argument that the pending §103 rejections fail to properly demonstrate motivation. But paragraph 2 does not go on to assert that the prior Office Action did establish motivation. Instead, paragraph 2 merely quotes some case law in support of the proposition that motivation must be shown in every §103 rejection. Applicants are in complete agreement with this case law, and the fact that motivation must be shown. And Applicants maintain their position that the pending §103 rejections fail to establish any motivation at all.

Second, paragraph 3 on page 2 indicates that it is responding to a prior argument by Applicants that Rim and Ward are non-analogous art. However, Applicants' last Response did not make any argument that Rim and Ward are non-analogous art.

Third, paragraph 4 on page 2 indicates that it is responding to Applicants' arguments about an intended use of the claimed invention. However, Applicants' last Response did not make any argument that even remotely relates to any intended use.

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Independent Claims 20 and 25

Independent Claims 20 and 25 each stand rejected under 35 U.S.C. §103 as obvious in view of a proposed combination of teachings from Yu U.S. Patent No. 6,784,101, Rim U.S. Patent No. 6,603,156 and Ward U.S. Application Publication No. 2005/0132952. These rejections are each respectfully traversed. As noted above, the present Office Action sets forth, word-for-word, exactly the same §103 rejections that were presented in the prior Office Action. Applicants' last Response pointed out some significant defects in these rejections, but the present Office Action never even mentions these defects, and does not modify the §103 rejections in an attempt to cure these defects. The PTO specifies in MPEP §2142 that:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

Applicants respectfully submit that Yu, Rim and Ward fail to establish a *prima facie* case of obviousness under §103 with respect to Claims 20 and 25, for mutually exclusive reasons that are discussed separately below.

PTO MUST CONSIDER INVENTION AS A WHOLE, NOT JUST A DIFFERENCE

In the present Office Action, the Examiner indicates that Yu discloses a device with a strained substrate, but admits there is a difference between Yu and the subject matter of each of Claims 20 and 25. As to Claim 20, the difference identified by the Examiner is that Yu does not teach his strained substrate could be an epi-silicon material, and in particular an epi-silicon material with the specific dislocation density that is expressly recited in Claim 20. As to Claim 25, the difference identified by the Examiner is that Yu does not teach his strained substrate could be an epi-silicon material, and in particular an epi-silicon material with the

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specific thickness that is expressly recited in Claim 25. The Examiner then focuses solely on each of these differences, and goes off to look for references that disclose these differences.

As to Claim 20, the Examiner asserts that Rim discloses an epi-silicon material, and that Ward discloses an epi-silicon material with the relevant dislocation density. As to Claim 25, the Examiner asserts that Rim discloses an epi-silicon material, and that Ward discloses an epi-silicon material with the relevant thickness. However, Ward merely discloses an epi-silicon material by itself, rather than any particular application for such a material, much less an application comparable to the specific type of device disclosed in Yu. Turning to Rim, Rim discloses an epi-silicon layer in combination with a couple of other layers, but Rim does not disclose a device that is even remotely similar to the type of device disclosed in Yu. Thus, in regard to the present invention, Rim and Ward each basically disclose just an epi-silicon material, and nothing else of interest.

Therefore, the Office Action identifies a respective difference between the Yu reference and each of Claims 20 and 25, and then focuses solely on each difference, without regard to context. In effect, the Examiner assumes that if each difference can itself be shown to be obvious, then Applicants' overall invention must also necessarily be obvious. But this approach is expressly prohibited by MPEP §2141.02, which emphasizes that:

**THE CLAIMED INVENTION MUST BE CONSIDERED
AS A WHOLE**

In determining the differences between the prior art and the claims, the question under 35 U.S.C. §103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. (Emphasis in original).

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Applicants respectfully submit that the approach taken in the Office Action runs afoul of this requirement of the MPEP. Accordingly, for this independent reason alone, it is respectfully submitted that Claims 20 and 25, when considered as a whole, are not rendered obvious under §103 by Yu, Rim and Ward.

THE REQUIREMENTS OF MPEP §2142 HAVE NOT BEEN MET

MPEP §2142 specifies that:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

Thus, all three of these requirements must be met in order to properly establish a *prima facie* case of obviousness under §103. But in the rejections of Claims 20 and 25, it is respectfully submitted that two of these three requirements have not been met. In particular, there has not been a proper showing of motivation to combine, or a proper showing that there would be a reasonable expectation of success. These two requirements are each discussed separately below.

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THERE IS NO MOTIVATION TO MAKE THE PROPOSED COMBINATION

Independent Claim 20 recites a device that includes:

a structure having a strained substrate formed thereover, the strained substrate comprising at least an uppermost strained-Si epi layer having a dislocation density of strained-Si epi of less than about $1E6/cm^2$;

at least one dielectric gate oxide portion over the strained substrate, the at least one dielectric gate oxide portion having a dielectric constant of greater than about 4.0; and

a device over each of the at least one dielectric gate oxide portion to complete the at least one high-k device.

Independent Claim 25 recites a device that includes:

a structure having a strained substrate formed thereover, the strained substrate comprising only an uppermost strained-Si epi layer having a thickness of from about 100 to 500Å;

at least one dielectric gate oxide portion over the strained substrate, the at least one dielectric gate oxide portion having a dielectric constant of greater than about 4.0; and

a device over each of the at least one dielectric gate oxide portion to complete the at least one high-k device.

In the Office Action, the Examiner indicates that Yu discloses a device with a strained substrate, but admits that Yu does not teach his strained substrate could be an epi-silicon material, and in particular an epi-silicon material with the specific dislocation density that is

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expressly recited in Claim 20, or the specific thickness that is expressly recited in Claim 25. The Examiner then goes on to assert that Rim discloses an epi-silicon material, and that Ward discloses an epi-silicon material with the dislocation density recited in Claim 20, and the thickness recited in Claim 25. However, Ward basically discloses an epi-silicon material by itself, rather than any particular application for such a material, much less an application comparable to the specific type of device disclosed in Yu. Turning to Rim, Rim discloses an epi-silicon layer in combination with a couple of other layers, but Rim does not disclose a device that is even remotely similar to the device disclosed in Yu. Thus, in regard to the present invention, Rim and Ward each basically disclose just an epi-silicon material, and nothing else of interest. But Applicants do not claim that their invention is just an epi-silicon material by itself. Instead, Applicants' Claims 20 and 25 are each directed to a specific type of device with a combination of elements in which an epi-silicon material is just one of the elements. And there is nothing in either Rim or Ward that teaches or suggests the epi-silicon materials disclosed therein could be used in a device of the specific type disclosed in Yu.

The present Office Action essentially asserts that it would be obvious to modify Yu by replacing Yu's strained layer 2 with a layer made from an epi-silicon material like that disclosed in Rim or Ward. But as discussed above, it is a PTO requirement that the Examiner must properly establish motivation for making this proposed modification to Yu. MPEP §2142 provides that:

To reach a proper determination under §103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. . . . Knowledge of applicant's disclosure must be put aside in reaching this determination, . . . impermissible hindsight must be avoided, and

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the legal conclusion must be reached on the basis of the facts
gleaned from the prior art.

In addition, the MPEP provides at § 2143.01 that:

The mere fact that references can be combined or modified does
not render the resultant combination obvious unless the prior art
also suggests the desirability of the combination. . . . Although a
prior art device "may be capable of being modified to run the way
the apparatus is claimed, there must be a suggestion or motivation
in the reference to do so". (Emphasis in original).

In the present situation, the only motivation proposed in the present Office Action with respect to
Claim 20 is that:

It would have been obvious to one . . . having ordinary skill in the
art at the time the invention was made to include the required epi-
silicon layer . . . [and] the required epi layer dislocation density . . .
in Yu et al. as taught by Rim and Ward et al. respectively, in order
to have a semiconductor device with increased performance.

Similarly, the only motivation proposed with respect to Claim 25 is that:

It would have been obvious to one . . . having ordinary skill in the
art at the time the invention was made to include the required epi-
silicon layer . . . and the required epi layer thickness in Yu et al. as

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taught by Rim and Ward et al. respectively, in order to have a semiconductor device with increased performance.

But as a practical matter, and as noted above, Rim and Ward each basically disclose just an epi-silicon material, and nothing else of any significance to the present invention. Neither Rim nor Ward discloses the use of epi-silicon in a device that is even remotely similar in structure to the type of device disclosed in Yu. Accordingly, there is nothing in either Rim or Ward that would tend to suggest to a person skilled in the art that the epi-silicon materials disclosed in Rim and Ward could be successfully used in the type of device disclosed in Yu.

The statements about motivation in the Office Action each conclude by vaguely asserting that a person skilled in the art would make the proposed combination "in order to have a semiconductor device with increased performance". But exactly what type of "increased performance" would this be? Faster operation? Reduced power consumption? Longer operational lifetime? The Office Action does not say. And contrary to the assertions in the Office Action, there is nothing in either Rim or Ward about a device of the type disclosed in Yu. Thus, neither Rim nor Ward could possibly teach that increased performance would necessarily result from using an epi-silicon material in this specific type of device. Moreover, Yu states that his device is already a "high performance" device (e.g. lines 24-27 in column 3). Therefore, since Yu teaches that his device is already a "high performance" device, why would a person skilled in the art believe that the performance of such a high performance device could be further increased? Applicants respectfully submit that Rim and Ward provide no motivation at all to try to increase the performance of the "high-performance" device disclosed in Yu. Thus, the Office Action does not properly establish any actual motivation for making the proposed modification to Yu, much less explain how the prior art would serve as the basis for this motivation. As a practical matter, the approach to motivation in the Office Action essentially boils down to an assertion that the proposed modification to Yu would have been well within the ordinary skill of the art. Stated differently, the Office Action is basically relying on the level of skill in the art to

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provide the suggestion to modify Yu. However, this approach is directly prohibited by the provisions of MPEP §2143.01, which state that:

**FACT THAT THE CLAIMED INVENTION IS WITHIN THE
CAPABILITIES OF ONE OF ORDINARY SKILL IN THE ART
IS NOT SUFFICIENT BY ITSELF TO ESTABLISH *PRIMA
FACIE* OBVIOUSNESS**

A statement that modifications of the prior art to meet the claimed invention would have been " 'well within the ordinary skill of the art at the time the claimed invention was made' " because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. [Case citations omitted] . . . (The level of skill in the art cannot be relied upon to provide the suggestion to combine references).

Thus, the approach to motivation in the Office Action is an approach that is directly prohibited by the provisions of MPEP §2143.01. The §103 rejections of Claims 20 and 25 are therefore not complete, because they fail to properly demonstrate the motivation that is required by the MPEP. In effect, these §103 rejections are each based on hindsight of the present invention, rather than on motivation properly derived from what was known prior to the present invention. Accordingly, for this independent reason alone, it is respectfully submitted that Claims 20 and 25 are not rendered obvious under §103 by Yu, even when considered in light of Rim and Ward, and notice to that effect is respectfully requested.

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THERE IS NO REASONABLE EXPECTATION OF SUCCESS

As discussed above, MPEP §2142 specifies that "there must be a reasonable expectation of success. . . . and the reasonable expectation of success must . . . be found in the prior art, and not based on applicant's disclosure". In the present situation, as explained above, Rim and Ward each disclose an epi-silicon material, but nothing else of relevance to the subject matter of either Claim 20 or Claim 25. In particular, neither Rim nor Ward discloses a device that is even remotely similar to the type of device that is disclosed in Yu. Consequently, neither Rim nor Ward contains anything that would tend to suggest that taking an epi-silicon material with a particular dislocation density or particular thickness and substituting it for a layer in Yu's device would yield a modified device that would not only operate, but would also provide performance superior to that of Yu's device. In other words, there is nothing in either Rim or Ward that would lead a person of ordinary skill in the art to believe that there would be any reasonable expectation of success. Apparently, the Examiner has relied on the teachings of Applicant's disclosure for a belief that there would be a reasonable expectation of success. But as noted above, MPEP §2142 expressly prohibits the Examiner from relying on Applicant's disclosure in regard to the expectation of success. Therefore, since the Office Action fails to even discuss the criteria of a reasonable expectation of success, much less explain why Rim or Ward would provide such an expectation, it is respectfully submitted that the Office Action fails to meet the requirements set forth in MPEP §2142 for establishing a prima facie case of obviousness. Accordingly, for this independent reason alone, it is respectfully submitted that Claims 20 and 25 are not rendered obvious under §103 by Yu, even when considered in light of Rim and Ward, and notice to that effect is respectfully requested.

For each of the various different reasons discussed above, it is respectfully submitted that the Office Action fails to establish a prima facie case of obviousness with respect to either Claim 20 or Claim 25. Accordingly, Claims 20 and 25 are not rendered obvious under §103 by Yu, Rim and Ward. Claims 20 and 25 are therefore believed to be allowable, and notice to that effect is respectfully requested.

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Dependent Claims

Claims 21-22 and 24 and Claims 26-27 respectively depend from Claim 20 and Claim 25, and are also believed to be distinct from the art of record, for example for the same reasons discussed above with respect to Claims 20 and 25, respectively.

Conclusion

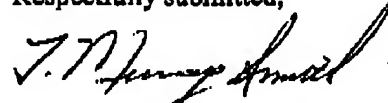
Based on the foregoing, it is respectfully submitted that all of the pending claims are fully allowable, and favorable reconsideration of this application is therefore respectfully requested. If the Examiner believes that examination of the present application may be advanced in any way by a telephone conference, the Examiner is invited to telephone the undersigned attorney at 972-739-8647.

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Although Applicants believe that no fee is due in association with the filing of this Response, the Commissioner is hereby authorized to charge any additional fee required by this paper, or to credit any overpayment, to Deposit Account No. 08-1394 of Haynes and Boone LLP.

Respectfully submitted,



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Date: April 20, 2006

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Enclosure: None

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